



IRANZ Connections.

Managing quake-induced springs

Over one hundred new springs have been reported in Christchurch since the September 2010 earthquake. "That may only be the tip of the iceberg," says Dr Helen Rutter, senior hydrogeologist at Aqualinc Research, who is investigating the source of new springs and providing remediation options where possible.

Dr Rutter explains there can be a number of reasons for the emergence of springs: the most common is where old, sealed artesian wells have been damaged. "Prior to a reticulated water supply becoming available, many Christchurch houses had private wells that were later sealed or capped. Following the earthquakes some of these appear to have popped up through flooring, but in reality the house and land have subsided over a buried well." However, there are also a number

of new springs, formed through the development of discontinuities in the upper confining layer above Christchurch's aquifer system. Others appear to have developed due to greater fracturing and enhanced permeability in the volcanic rocks of the Port Hills.

There is no single answer to remediation, but all approaches depend on being able to successfully identify the source of the water. Where springs occur due to a reactivated artesian well, or a disruption in the confining layer, these springs can be sealed through pumping grout into the well, or the cracks in the confining layers, under pressure. If the cause is enhanced permeability in the volcanic rocks, the only solution is to divert water away through drainage.

www.aqualinc.co.nz

GROUT INJECTION TO SEAL UP A QUAKE-INDUCED SPRING THAT FORMED UNDER A HOUSE IN CHRISTCHURCH

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Sampling the sea floor's phosphate

CRL Energy is aiding Chatham Rock Phosphate in their quest to mine seafloor rock phosphate at 400m water depth on the Chatham Rise.

CRL Energy is processing in excess of 50 grab samples some weighing 1,000kg or more, which Chatham Rock Phosphate harvested on a voyage earlier this year.

To meet Chatham Rock Phosphate's needs, CRL Energy had to rapidly source, construct, and prove the necessary plant to separate phosphate nodules from the mammoth sample load.

The final processing system is made up of a hopper and conveyor system feeding a large concrete mixer used to agitate the clay-like sediment samples in water, then a

series of sieves to separate different sizes of nodules and retain the fine material

The target phosphate extracted in the processing sits mainly in the uppermost half metre of the seabed as nodules mixed with a greenish sand/silt sediment overlying a white chalky layer beneath. To further complicate the geology the rise is extensively scoured by icebergs, which have left deep furrows in places.

At present, New Zealand uses approximately one million tonnes of phosphate rock annually for fertilizer manufacture; this is mostly imported from Morocco.

Chatham Rock Phosphate's licence area is 4,726 square kilometres, 450 km east of Christchurch. The sample separation and analysis work supplied by CRL Energy will be used by Chatham Rock Phosphate in planning their future work programme.

www.crl.co.nz



ROCK PHOSPHATE NODULES

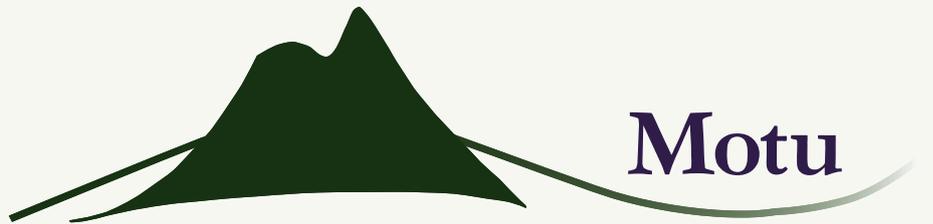
Introducing Motu

IRANZ welcomed Motu as a new member in June.

Motu is a non-profit research institute that carries out long-term economic and public policy research programmes. High quality data and the use of sophisticated quantitative techniques are critical to Motu's research.

Motu's research topics range from economic productivity to population to climate change policies. Using Statistics New Zealand's longitudinal business database, Motu's researchers assess many dimensions of firm activity and performance over periods of up to a decade. The productivity of broadband is widely heralded, but research at Motu led by Arthur Grimes was the first internationally to quantify the firm level benefits of broadband.

Suzi Kerr leads research into the impacts



Motu Economic and Public Policy Research

of climate change policy on land use. Built by Motu Researchers, the Land Use in Rural New Zealand model provides insights from data into the impact of emissions trading, and afforestation schemes on the utilisation of land.

An ageing population has significant implications for New Zealand, increasing the costs of retirement income and healthcare, as well as the cost and availability of housing for young people. Research undertaken by Andrew Coleman concludes that current pay-as-you-go arrangements for superannuation will see future New Zealanders face higher taxes,

relative to countries with save-as-you-go schemes. This research makes a case for considering how New Zealand might transition to a prefunded scheme.

Increases in human knowledge are central to economic growth. How ideas get transferred is another research area for Motu. Izi Sin recently completed her PhD at Stanford, where she researched changes in the pattern of book translations following the fall of the "Iron Curtain" as one measure of the diffusion of ideas.

www.motu.org.nz

Opus translates road surface research for industry

John Patrick, Opus Technical Principal - Pavements, was the main speaker at five meetings on road surfacing held throughout New Zealand recently. The New Zealand Transport Agency (NZTA) hosted these events to provide technical updates to industry and to seek feedback on research and technical issues.

In his presentations John showed how practitioners could use the results from current research to manage road surfacing in the current economic climate. With current funding restraints, John says it is important that those managing road networks increase their

understanding of how the NZTA drivers of "Value for Money" and "Customers First" could be delivered and how innovative solutions were being developed.

John explained that there are differences in road surfacing lives between regions and the reasons for these differences are being explored. He stressed that managers of road networks need to use appropriate statistical measures to compare the surfacing lives between regions in order to determine surfacing priorities. He also demonstrated that current research is challenging the traditional understanding of how road surfaces fail.

www.opus.co.nz

Mobile phone apps for improved driving

TERNZ is investigating the use of mobile phone applications (apps) for promoting safer and more p-efficient driving. Modern smart phones are typically fitted with accelerometers and GPS receivers and the signals from these transducers can be accessed by software applications.

A number of apps use the information from smart phones to monitor aspects of driving behaviour such as acceleration, braking, cornering and speed. By providing feedback to the driver these apps encourage smoother driving which has beneficial effects for both safety and

fuel efficiency. Jointly funded by the New Zealand Transport Agency and EECA, TERNZ's study identified the most promising app. This app is now undergoing a trial with a group of drivers to assess its effectiveness.

www.ternz.co.nz



SCREENSHOT OF THE DRIVEGAIN APP

Cawthron appoints Professor Charles Eason

Professor Charles Eason started as Cawthron's Chief Executive in June. Professor Eason provides a strong scientific research based leadership; his experience in progressing core science through to practical industry solutions is key to Cawthron's philosophy. Charles Eason's science background includes research and senior management positions in multinational pharmaceutical companies, and experience in New Zealand with a Crown Research Institute, a university and a manufacturing business. He has led research groups in drug design, catchment management, conservation, and product development, and played a major role overseas developing drugs for cardiovascular diseases. Charles is well known to Cawthron, having served on the Cawthron Trust Board (1998 – 2003) and the Board of Directors from 2003.

www.cawthron.org.nz

Adding value to exported ovine skins

LASRA® is leading the charge to increase the export value of New Zealand lamb and sheep skins. Lamb and sheep skins are conventionally part-processed into pickled pelts and exported into commodity markets for making garment leathers. In contrast, the light-weight women's and children's footwear market requires leather with specialised features, which means it provides a more lucrative margin. The most important footwear leather property is tear strength which is required to be about five times greater than for garment leather.

LASRA in collaboration with Massey University is using a fundamental science discovery approach to improve New

Zealand's sheep and lamb footwear leather properties in the Ovine Consortium Research Project. It is funded by the Ministry of Business Innovation and Employment and LASRA's industry members. Dr Warren Bryson, LASRA Director, says that fifty per cent success in this venture has potential to add \$88 million to the export value of sheep and lamb pelts.

One component of the research is using a proteomics approach to study changes in skin composition related to its physical strength. Skin proteins are separated in two-dimensions to make protein maps. Each protein can be located by its physical co-ordinates on the map, and can be

identified using high resolution tandem mass spectrometry.

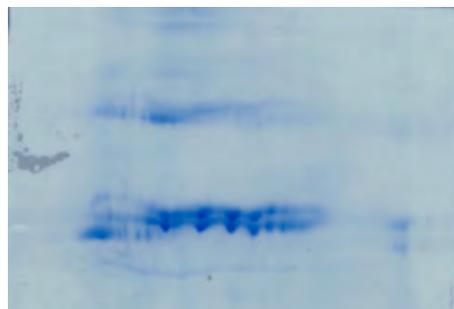
Differences in protein quantities can be identified from each skin's protein map and in turn be related to the physical strength differences between the skins. This baseline information is being used to compare the effects of skin processing and alternative, less aggressive, processing technologies on strength and other important footwear leather relevant properties. Successful technologies will be developed to make ovine leather that fulfils the required specifications of overseas footwear leather markets.

www.lasra.co.nz

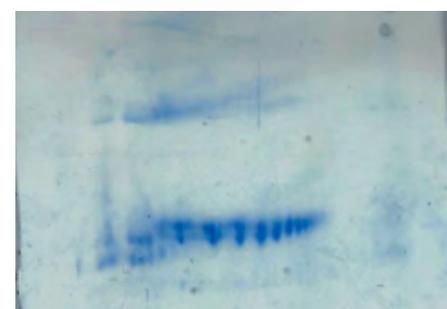
(i) PROTEIN MAPS OF CATTLE HIDE



(ii) PICKLED SHEEP SKIN



(iii) PICKLED STRONG SHEEP SKIN



Cawthron Analytical Services concentrates efforts on supporting New Zealand Exporters

The sale of its wine and Blenheim microbiological testing services and environmental chemistry testing division, is part of Cawthron Institute's strategy to refocus its business on supporting the food and functional food industries.

"Moving forward we will expand our laboratory work into established areas of strength, such as research, test development, food safety and certification, dietary supplements, algal technologies and natural toxin testing," says Business Development Manager for Analytical Services Augusta van Wijk.

The move will allow Cawthron to play to its core strengths, which have most recently resulted in the opening up of extremely lucrative new markets through the sale of minute amounts of complex organic compounds sourced from algae.

Cawthron will continue to provide all microbiological testing, food chemistry, dietary supplements and natural toxin testing and test development services from its Nelson laboratories. These laboratories



CAWTHRON ANALYTICAL TESTING

provide an independent testing facility to ensure a wide range of manufacturers are able to meet compliance and regulatory obligations.

Alongside routine analytical services, Cawthron has a specialist analytical research and development team who work with industries to develop customised analytical solutions through method development, validation of existing methods and general chemical and

laboratory consulting services.

"Methods can be developed and transferred seamlessly into our routine laboratory for on-going testing if required," says Ms van Wijk.

"Our focus is on helping exporters prove the quality, safety and integrity of their products so they can export them to the world," she says.

www.cawthron.org.nz

WAVE goodbye to moisture problems!

In response to the leaky building crisis, BRANZ established the engineering basis for wall cavities. Arising from that work was a broader question – how do we stop the next ‘crisis’ from happening? BRANZ’s six-year Weathertightness, Air quality and Ventilation Engineering (WAVE) programme, now in its fourth year, directly addresses that concern.

Jointly funded by the Building Research Levy and the Ministry of Business Innovation and Employment, the WAVE programme aims to develop practical solutions to moisture problems in New Zealand homes.

One of the programme’s goals is to provide a performance basis for weathertight design and seeks to improve indoor environments, helping to avoid future issues resulting from changes to designs, materials and construction methods.



Determining the best ventilation strategy for New Zealand homes

The WAVE programme is split into four complementary streams:

- Weathertightness
- Interstitial moisture
- Indoor air quality
- Ventilation

A technical aim of WAVE is to develop a computer model that describes how moisture and other contaminants behave in an entire building. Each individual task in the WAVE programme will help develop this capability and answer important questions for the building industry at the same time. www.branz.co.nz

Foreign Language versions for IRRICAD irrigation design software



IRRICAD is a software package for the design of pressurised irrigation systems which has been developed and commercialised by Lincoln Ventures since 1988. Targeted at a specific market segment and distributed internationally by Nelson Irrigation Corporation and Netafim, Irricad has become the world leader in its space.

In the latest development, Lincoln Ventures has undertaken the significant task of incorporating foreign language support into the core software. French and Spanish versions have been the first languages to be incorporated, with more versions planned in line with feedback from the commercial distributors and a push for sales in Europe. This comes as part of the latest version 11.5 of the software. Lincoln Ventures has an active

development and release cycle with one to two new versions being released by its dedicated inhouse developers each year.

Lincoln Ventures CEO, Peter Barrowclough says “we’re very proud of the story of IRRICAD, and its demonstration that New Zealand research organisations can commercialise internationally relevant products like this. We have great relationships with our international distributors and are optimistic that the business will grow with the introduction of foreign language versions. This is a great example of the software development and computer modelling capabilities inherent within our organisation. We’ve got a track record of successfully applied projects in Agritech, Industry and the Environment and we are optimistic about our future.” www.lv.co.nz

The continued growth of laser sintering

Demand for Titanium 3D laser sintering is increasing, and TiDA is leading the way in producing complex parts for its clients using this technology.

Laser sintering is a consolidation method which involves laying down a layer of powder, and then using a laser to selectively melt the powder to form the required object. TiDA utilises the only titanium capable laser sintering machine in Australasia. TiDA also offers plastic moulded 3D printing, which allows some concept drawings to be easily, quickly and cost effectively printed and tested in basic ABS plastic, prior to laser sintering.

Data sheets will be available soon to assist with the design process and develop new parameters in research. The results of the testing programmes are very positive, with the laser sintering parts being the equivalent or better than wrought material.

www.tida.co.nz



LASER SINTERING MACHINE
(PHOTO COURTESY OF CHRIS PARKER PHOTOGRAPHY)

Who we are:

IRANZ is an association of independent research organisations. Its members undertake scientific research, development or technology transfer. Members include Aqualinc Research Ltd, BRANZ, Cawthron Institute, CRL Energy Ltd, Heavy Engineering Research Association (HERA), Leather & Shoe Research Association (LASRA), Lincoln Ventures Ltd, Motu Economic and Public Policy Research, Opus Central Laboratories, Titanium Industry Development Association (TiDA) and Transport Engineering Research NZ Ltd (TERNZ).

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